SURVIAC Bulletin

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SURVIVABILITY/VULNERABILITY INFORMATION ANALYSIS CENTER

SURVIAC is a U.S. Department of Defense Information Analysis Center (IAC) sponsored by the Defense Information Systems Agency (DISA), Defense Technical Information Center (DTIC).

Threat Warheads & Effects/Battle Damage Assessment and Repair (TWE/BDAR) Training

The TWE/BDAR training project is one of several Live Fire Test and Training Initiatives sponsored and funded by the Office of Live Fire Test & Evaluation (OSD/OT&E/LFT&E). This three-phase project has been started as a new program seeking to refine and further define known areas where the LFT&E data can be used to improve combat operations and warfighting capability. The purpose of the TWE/BDAR training program is to provide an efficient and effective method to capture, store and retrieve Joint Live Fire (JLF), LFT&E, combat, BDAR and TWE information that can be applied in a variety of innovative training methods and media to enhance the proficiency of combat maintainers and operators. The focus will be placed on providing many different users convenient ways to access and use this information in a variety of media to meet their peculiar training needs. The approach to this effort was divided into two parts. The first part was to research and formulate a concept for identifying and capturing the information. The second part was to build an archival and retrieval system to meet the

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SURVIAC, a DoD Information Analysis Center (IAC), is administratively managed by the Defense Information Systems Agency (DISA), Defense Technical Information Center (DTIC), under the DoD IAC Program. SURVIAC is sponsored by the Joint Technical Coordinating Groups on Aircraft Survivability (JTCG/AS) and for Munitions Effectiveness (JTCG/ME). SURVIAC is operated by Booz•Allen & Hamilton Inc. The Contracting Officers Technical Representative (COTR) for the Center is Mr. Martin L. Lentz, AFRL/VACS Bldg 63, 1901 Tenth Street, Wright-Patterson AFB Ohio 45433-7605. He may be reached at DSN 785-6302 or (937) 255-6302.

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INITIAL COMPONENT VULNERABILITY ANALYSIS ARCHIVE DATA POPULATION EFFORT COMPLETED

One of the most critical and debated inputs to the nonnuclear vulnerability analysis process is an estimate of the probability of kill given a hit (Pk/h). The Pk/h value is unique to each target design since it is a function of both the component response and the response of the target given that component response. For example, loss of thrust of a turbofan engine can result in the loss of a single engine aircraft, but may not result in the loss of a multi-engine aircraft.

This Pk/h function can thus be defined as the product of two probabilities, the probability of component damage given a hit (Pd/h or Pcd/h) and the probability of achieving the defined target kill given that component damage (Pk/d). The Pk/d function is unique to the component installation in the target, while the Pd/h (or Pcd/h) is a function of the component design. Since the Pd/h (or Pcd/h) is dependent on the component construction, estimates can be made for specific component designs and used in analyses of their installation in various targets. In order to archive these component vulnerability data and the associated methodologies the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME) and the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS) initiated the Joint Component Vulnerability Project (JCVP). As part of the JCVP a Component Vulnerability Analysis Archive (CVAA) computerized database program was developed. A SURVIAC effort to populate the CVAA in the area of propulsion system data and associated analyses for aerial and ground targets has just been completed. Two products were generated, a disk containing the updated CVAA data and a summary report. The report, JTCG/AS-99-M-006, "Collection and Incorporation of Propulsion Data into the Component Vulnerability Analysis Archive," documents the procedures developed for review and selection of data and the associated "lessons learned" during this initial population effort. It also contains a bibliography of reports used in the Services to provide inputs to vulnerability analyses. The CVAA program is being improved and will be placed into SURVIAC for distribution after this upgrade is completed. The report may be obtained from SURVIAC. Future efforts are planned to incorporate data and analysis techniques for other systems into CVAA.

For more information on the CVAA database, please contact Mr. Gerald Bennett, SURVIAC, Com: (937) 255-4840, DSN: 785-4840 or E-mail: gbennett@bah.com

'. . . loss of thrust of a turbofan engine can result in the loss of a single engine aircraft, but may not result in the loss of a multi-engine aircraft. . .'

SUGGESTIONS?

SURVIAC welcomes your input. Whether you wish to submit an article for publication in the SURVIAC Bulletin, comment on a featured article, or simply let us know how we are doing, we want your input!

Contact Linda Ryan at SURVIA:
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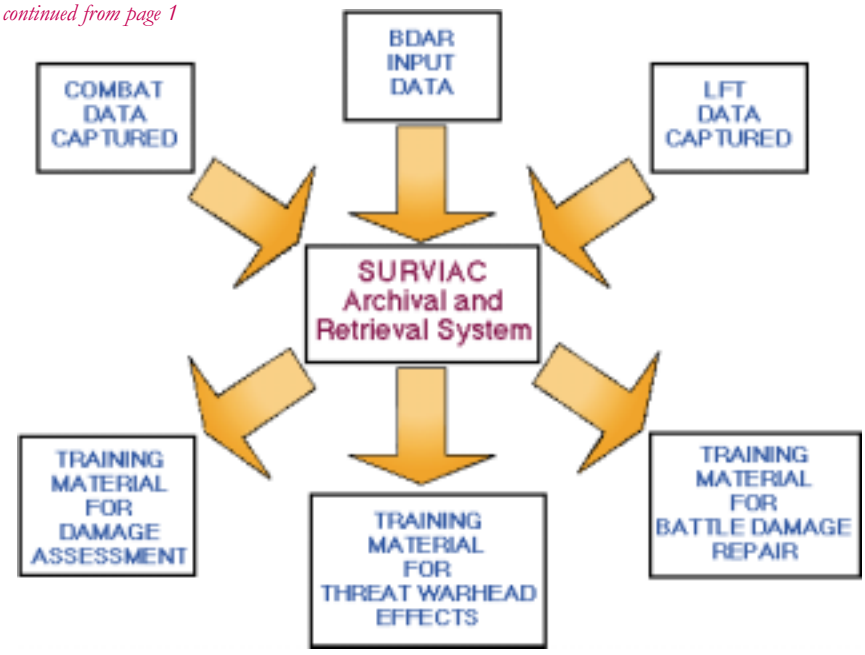

Figure 1. The Vision for the TWE/BDAR Archival and Retrieval System

'The TWE/BDAR Training system vision is to become truly a force multiplying combat resource.'

training requirements. Booz•Allen & Hamilton Inc., SURVICE Engineering Company and Skyward, Ltd. are working together as a team with Army, Navy and Air Force representatives to support OSD on this project. The team has completed Phase 1 of the project.

Figure 1 illustrates the information spectrum envisioned for the TWE/BDAR archival and retrieval system. All available JLF, LFT, threat warhead effects, combat, and BDAR program data, et. al., will be captured and archived in the TWE/BDAR archival and retrieval system. From this system, materials for an almost unlimited set of training requirements can be pulled (customer request) or pushed (anticipation of customer need) and thereby be provided to customers to meet their needs. Connectivity by the customer to the TWE/BDAR system and outputs and products from the system will be limited only by technology affordability and information release restrictions. The TWE/BDAR archival and retrieval system vision is to become truly a force multiplying combat resource.

Research has been and continues to be conducted to identify existing programs and systems that contain pertinent information and functions that could be useful to the TWE/BDAR archival and retrieval system. The TWE/BDAR team continues to conduct interviews with personnel to identify potential users and potential sources of information for the system. So far personnel from numerous service organizations have been interviewed to determine user requirements for the program:

Wright-Patterson AFB, OH

- AFRL/VACS - ABDR Research and Development
- AFRL/HESR - ABDAR Project
- AFRL Air Vehicles Directorate Air Defenses Lethality Team (ADLT)
- 445 CLSS - ABDR Training Personnel
- HQ Air Force Materiel Command (AFMC)/LGMC - CLSS Program,

Fort Eustis, VA

- US Army Air Logistics School (USAALS)
- Department of Aviation Trades Training (DATT)

Aberdeen Proving Ground, MD

- US Army Ordnance Center & School (USAOC&S/BDAR)

Redstone Arsenal, AL

- PM-SPORT

Fort Lee, VA

- Combined Arms Support Command (CASCOM)
- Army Diagnostics Improvement Program (ADIP)

McClellan AFB, CA

- 940 CLSS - ABDR Training Personnel
- SM-ALC - ABDR Program Management Office (PMO)
- 652 CLSS - ABDR Training Personnel

Hurlburt Field, FL

- 16 LSS - ABDR Training Personnel
- HQ AF Special Operations Command (AFSOC) - Intelligence Support

BENEFITS

Three areas where JLF and LFT&E information are believed to have direct beneficial applicability have been identified and have been explored by the TWE/BDAR training project team. These areas are:

BDAR engineering and technician familiarization and training. Some BDAR engineers and technicians have first-hand experience with repair of damage inflicted by modern, realistic threats on frontline weapon systems. However, a large percentage, probably a majority, of BDAR engineers and technicians do not have the benefit of this experience or training. Technologies and methods are available whereby NCOs and Officers might use the TWE/BDAR database to prepare training for their Soldiers, Airmen and Marines to acquaint them with real world damage and repair approaches. This training would encompass the whole spectrum from initial to refresher training.

Augmentation of instruction materials provided to BDAR and maintenance instructors. To a large extent, BDAR training relies on the study of damage and repair case histories - detailed stories of weapon system damage and how the repair approach was devised and carried out. Many programs are underway in the services that will provide maintenance/technical data to maintainers in electronic form. But, without additional assistance, these efforts will not include those case histories that could inject a better sense of realism as to what the effects of real world threats are on modern weapon systems. State-of-the-art data presentation technology packaged or developed by this project could be used to provide "virtual" training tools for the training instructors.

Threat lethality and effects information for operations, intelligence, maintenance, tactics and war planning personnel. Recent Air Force programs have demonstrated conclusively the positive benefits threat warheads and effects training can have on operational effectiveness. It has been shown familiarization training is needed across all organizations and individuals that directly support combat operations. For example, a realistic understanding of the lethality of threat projectiles and missiles leads to better integration of available information (intelligence, aircrew observations, system damage documented by maintenance, etc.) for rapid decision making during combat operations. This project can provide a flexible and comprehensive database of JLF, LFT&E, combat, and warhead exploitation data to form the basis for tailored, focused and timely prepara-

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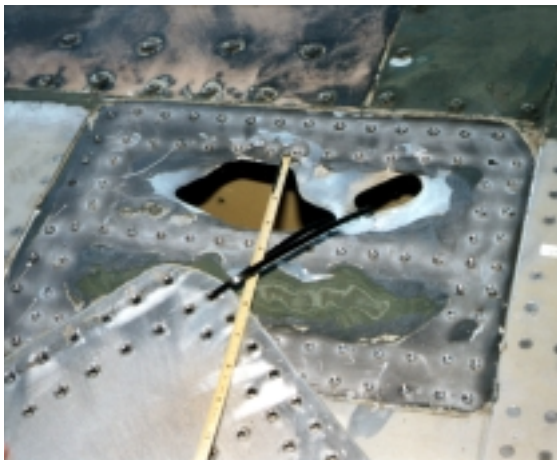
tion of presentation aids and materials for threat lethality and effects training.

A wide range of users is envisioned for the TWE/BDAR archival and retrieval system. Two categories of support to these users are anticipated - training and awareness. The former represents support to initial, refresher and continuing proficiency training courses for combat operations and maintenance personnel. BDAR program participants, e.g., assessors, technicians and engineers, would be users for this training. Their training would be enhanced through innovative uses and presentations of realistic combat damage and the resulting repair. A second category of users includes managers at all levels involved in live fire test and BDAR programs, including acquisition community officials. These users occasionally need quick reaction information to support briefings or program actions where informed and on-target information for a briefing or a point paper, for example, might make the difference in preserving the integrity of the BDAR program in a new system acquisition. Test managers and engineers involved in live fire tests can also use the data to improve planning for their programs.

'A wide range of users is envisioned for the TWE/BDAR archival and retrieval system.'

The types and forms of data to be contained in the TWE/BDAR archival and retrieval system will drive the detailed system requirements and establish the data formats for storage and archival of the captured data. User training equipment capabilities will need to be taken into account as the output presentation media are defined. If typical users can not use technologically advanced outputs and products because of equipment limitations, that information must be carefully evaluated before being included in the detailed system requirements. Direct user data access capability requirements will be tempered by such factors as distribution limitations on the data such as classification issues, if required. Table 1 describes typical data types and forms for the information of interest to the TWE/BDAR archival and retrieval system users.



The types and forms of the data to be archived have been reviewed and discussed with both SURVIAC personnel and data generators during Phase 1 data gathering efforts. For example, damage data provided as a TWE/BDAR archival and retrieval system product and destined for use by a BDAR Assessor Training Tool may require photographic documentation of damage and repairs at a higher resolution than would normally be used to satisfy the basic purpose of the live fire test. Similarly, a high-precision coordinate system may need to be included in the photography so the test article damage and repair can be properly integrated into the coordinate system of the Assessor Tool's geometric description. These diverse requirements have been investigated as part of the process leading to formulation of the data capture concept.

Phase 1 determined that, for the near term, likely users are anxious to obtain data from the TWE/BDAR training system to augment their current training materials, but their level of training support equipment sophistication is low. In fact, the users most enthused about the prospect of having access to the TWE/BDAR

archival and retrieval system, would be satisfied with pictures, movies, videos, and relevant hard copy information of the types and forms shown at the top portion of Table 1. Training aids commonly in use remain the video and overhead transparencies. Most prospective users have computers with access to the Internet, but the technology tends to be somewhat dated. Within the users' units, at least one computer will have a CD-ROM, and the computers tend to be connected via a local area network. Some users are training with computer-generated slide shows and electronic projection of images to a projection screen. However, at present, most offices have basically a rudimentary capability at best. This means for the near term, the TWE/BDAR archival and retrieval system must accommodate relatively low technology user equipment yet be structured to accommodate some high technology users.

The TWE/BDAR archival and retrieval system must capture and store relevant data to support the needs of its users. There are three situations under which these data will be captured - (1) Data from existing SURVIAC combat and live fire data archives, (2) New data being generated by on-going or future test programs or conflicts, and (3) Data that exist in other databases that must be accessed to support user needs.

The bulk of the data required for input to the system to meet user needs either reside at SURVIAC now or, by direction, are to be sent to SURVIAC in the future for archival as they are generated. The data exist in many types and forms as discussed earlier. The TWE/BDAR archival and retrieval system can and will be designed to accommodate these types and forms. Input of the data should be straightforward, but will depend upon the system architecture and design.

Phase 2 efforts will build on the results of the first phase. This effort will identify and formulate information application concepts for course and courseware. These application concepts will also be used during Phase 3 for the user organizations to produce realistic proficiency training and instruction, and field demonstrations. The efforts will expand the archival and retrieval system and culminate into a functional application for field use.

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Table 1. TWE/BDAR Archival and Retrieval System Data Types and Forms

Data Type and Form	Data Category				
	BDAR Data	Combat Data	JLF Data	LFT&E Data	Threat Effects Data
Photographs - Film, Still	X	X	X	X	X
Photographs - Digital, Still	X	X	X	X	X
Movies - Film, Low-Speed			X	X	X
Movies - Film, High-Speed			X	X	X
Video - Film	X	X	X	X	X
Video - Digital	X	X	X	X	X
Reports - Hard Copy	X		X	X	X
Reports - Electronic			X	X	X
Narratives - Hard Copy	X	X	X	X	X
Narratives - Electronic	X	X	X	X	X
Narratives - Handwritten	X	X	X	X	X

SURVIAC Product Availability

SURVIAC is a U.S. Department of Defense Information Analysis Center (IAC) sponsored by the Defense Technical Information Center (DTIC)

Products

Product	Classification	Reproduction & Handling Fee
A Critical Review of Graphite Epoxy Laser Damage Studies	SECRET	$ 50.00
A Summary of Aerospace Vehicle Computerized Geometric Descriptions for Vulnerability Analyses	Unclassified	$100.00 (Free to Gov't)
Advanced Materials for Enhanced Survivability	SECRET	$100.00
Aircraft Engine Analysts Reference Manuals (ARM) - 9 Volumes	SECRET	$400.00/Per Set
Aircraft Fuel System Fire and Explosion Suppression Design Guide	Unclassified	$150.00/3 Volumes
'Aircraft Survivability' Video	Unclassified	$ 50.00 or 30-Day Loan
Alternatives For Halon 1301 In Army Ground Vehicle Firefighting Systems	Unclassified	$250.00
An Overview of Laser-Induced Eye Effects	SECRET	$150.00
An Overview of Laser Technology and Applications	Unclassified	$ 50.00
Army Survivability Information Resource Database	Unclassified	$200.00
'Battle Damage Repair of Composite Structures' Video	Unclassified	$ 75.00
Collection of Vulnerability Test Results for Typical Aircraft Systems and Components	CONFIDENTIAL	$150.00
Comparative Close Air Support Vulnerability Assessment Study - Executive Summary	SECRET	None (Gov't. Only)
Compendium of References for Nonnuclear Aircraft Survivability (A Supplement to MIL-HDBK-336)	Unclassified	$150.00
Component Vulnerability (Pd/h) Workshop Component Pd/h Handbook w/addendum	SECRET	$200.00 (Free to Gov't)
Countermeasures Handbook for Aircraft Survivability (3 Volumes)	SECRET	$200.00 (Free to Gov't)
Critical Review and Technology Assessment (CRTA) for Soldier Survivability (SSv)	Unclassified	$50.00
'Designing for Survivability' Video	Unclassified	30-Day Loan
DOD Directive 5000.1 and DOD Instruction 5000.2/5000.2M Survivability Excerpts	Unclassified	$ 50.00 (Free to Gov't)
Fuel Tank Ullage Explosion Hazard State-of-the-Art Report (SOAR)	Unclassified	$ 50.00
Gas Explosion Suppression Agent Investigation	Unclassified	$200.00
Ground Combat Vehicle Survivability Database (GCVSD)	SECRET	$200.00
Joint Live Fire/Live Fire Test Program Catalogue, Version 3.1	Unclassified	$ 95.00
Joint Live Fire Test Program Aircraft Systems FY86, 87, 88 and FY88-90 Videos	Unclassified	$ 50.00/Each
Penetration Characteristics of Advanced Engine Materials	Unclassified	$100.00
Proceedings of the Eighth DOD Conference on DEW Vulnerability, Survivability and Effects - 2 Volumes	SECRET	$125.00/Per Set
Proceedings of the National MANPADS Workshop - A Vulnerability Perspective -2 Volumes	SECRET	$100.00/Volume
RADGUNS 1.8 Parametric Study	SECRET	$100.00 (Free to Gov't)
Ship Survivability Overview	Unclassified	$ 50.00
'SURVIAC - A Capabilities Overview' Video	Unclassified	30-Day Loan
Survivability Systems Master Plan	Unclassified	$ 50.00 (Free to Gov't)
Testing of Aircraft or Aircraft Surrogates with On-Board Munitions	Unclassified	$100.00
"Threat Effects in Aircraft Combat Survivability" Video	Unclassified	$150.00 or 60-Day Loan
Unmanned Aerial Vehicles Survivability Compendium—Interim Report Database	Unclassified	$200.00
U.S. Air Force Surface-To-Air Engagements During Operation Desert Storm	SECRET	$100.00 (Free to Gov't)
Vulnerability Reduction Design Guide for Ground Systems in a Conventional Combat Environment	Unclassified	$200.00

For further information on how to obtain these products and how to establish need-to-know certification, please contact SURVIAC at (937) 255-4840 or DSN 785-4840. Requests from non-U.S. agencies must be forwarded to their country's Embassy in Washington DC, Attn: Air Attache's Office.

SURVIAC Model Availability

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Model	Classification	Reproduction & Handeling Fee	
		Model	Documentation
AASPEM 4.1—Air-To-Air System Performance Evaluation Model	Unclassified	$500.00	$ 80.00
AIRADE 7.4—Airborne Radar Detection Model	Unclassified	$500.00	$ 36.00
ALARM 4.0—Advanced Low Altitude Radar Model	Unclassified	$500.00	$ 60.50
BLUEMAX IV—Variable Airspeed Flight Path Generator	Unclassified	$500.00	$ 15.00
BRAWLER 6.3—Air-To-Air Combat Simulation	SECRET	$500.00	$231.50
BRL-CAD—Ballistic Research Laboratory Computer-Aided Design Package*	Unclassified	$500.00	N/A
COVART 4.1—Computation of Vulnerable Area and Repair Time	Unclassified	$500.00	$ 37.00
DIME—Digital Integrated Modeling Environment	Unclassified	$500.00	$ 63.00
ESAMS 2.8.2—Enhanced Surface-To-Air Missile Simulation	SECRET	$500.00	TBA
FASTGEN 3.2—Fast Shotline Generator	Unclassified	$500.00	$ 52.00
IBDSim—Interactive Battlefield Dynamics Simulation Model	Unclassified	$500.00	$288.50
IVIEW 2000—Graphical User Interface for Output Simulation	Unclassified	$100.00	++
JSEM - Joint Service Endgame Model	Unclassified	$500.00	TBA**
LELAWS 3.0—Low Energy Laser Weapons Simulation	Unclassified	$500.00	$ 31.50
McPTD 2.1—RCS Computation Based on Physical Theory of Defraction	Unclassified	$500.00	$ 15.00
RADGUNS 2.1—Radar-Directed Gun System Simulation	SECRET	$500.00	$ 57.00
TRAP 3.1a—Trajectory Analysis Program	Unclassified	$500.00	$256.00
TRACES—Terrain/Rotorcraft Air Combat Evaluation Simulation	Unclassified	$500.00	$127.00

* For more information regarding BRL-CAD, contact Mr. Bob Strausser at the SURVIAC Aberdeen Satellite, Office, (410) 273-7722.

** For JSEM documentation, contact Sue Ellen Wojciechowski, (410) 273-7722

++ Documentation files are contained in the code.

Models

For further information on how to obtain these models and how to establish need-to-know certification, please contact SURVIAC at (937) 255-4840 or DSN 785-4840. Requests from non-U.S. agencies must be forwarded to their country's Embassy in Washington DC, Attn: Air Attache's Office.

Man-In-the-Loop Air-to-Air System Performance Evaluation Model II (MIL II)

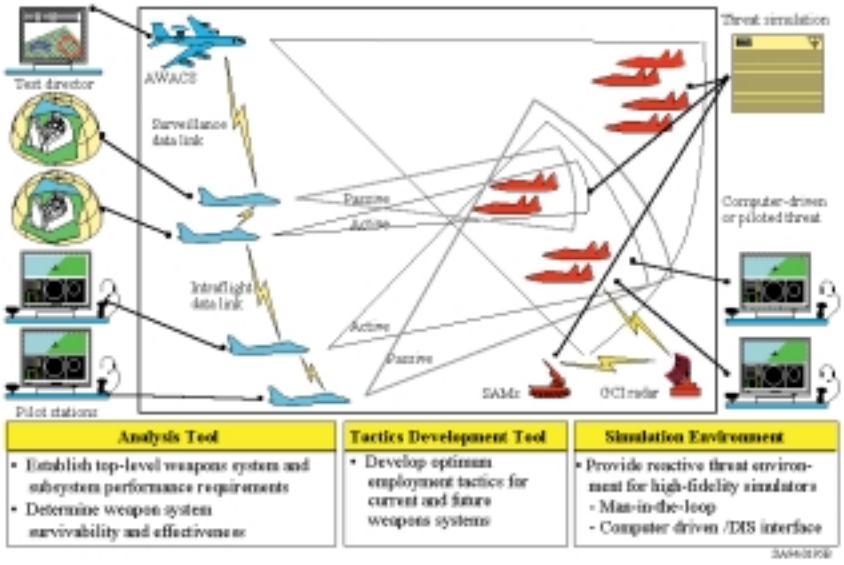
by Scott Fullencamp, NAIC

INTRODUCTION

SURVIAC introduces the evolutionary replacement to the legacy Air-to-Air System Performance Evaluation Model (AASPEM) known as the Man-In-the-Loop Air-to-Air System Performance Evaluation Model II (MIL II). MIL II is an air combat model used to evaluate weapon system performance and effectiveness in air-to-air combat. MIL II offers man-in-the-loop capability, providing human interaction and feedback to the evaluation process and offering a cost-effective alternative to full mission dome simulation (within limits).

MIL II is an evolutionary development from the legacy AASPEM model. MIL II is much improved and more powerful because the user has the option of defining the levels of detail and player interactions to varying degrees. Visibility into model functions and troubleshooting are greatly enhanced in MIL II because of the C++ object oriented design. Because of its flexibility, MIL II is more tailorable to the customer's requirements.

MIL II is a tactical real-time engagement model for MvN players. MIL II is primarily a beyond-visual-range (BVR) air-to-air model. The rule-based pilot decision logic (PDL) provides a consistent, traceable set of logic for computer-controlled players. The model is deterministic, i.e., rule based and repeatable (the only Monte Carlo routine is the draw against Pk at missile intercept). MIL II has been utilized in system and subsystem requirements and effectiveness analyses, in tactics development, as a threat environment for other simulations, as a high fidelity MIL fighter for mission level models (i.e., SWEG), for scripted scenario development and for pure weapon system comparisons. In addition, the model provides the capability to evaluate limited within visual range (WVR), surface-to-air and air-to-ground engagements. This provides



MAN-IN-THE-LOOP AIR-TO-AIR
SYSTEM PERFORMANCE EVALUATION MODEL II

the capability to evaluate limited integrated air defense scenarios (IADS).

MIL II FUNCTIONAL CAPABILITY

In order to simulate air combat, MIL II models environmental, aircraft, missile, and ground weapon system functions. The simulated environment includes (homogeneous) atmospheric effects, gravity and surface impact functions. The user can also input specified climatological conditions for a desired geographic location. The earth representation is a flat, non-rotating, 1 'g' earth.

MIL II models aircraft vehicle limitations (structural, weight, fuel and control rate), aerodynamics (lift, drag, angle-of-attack), propulsion (military and afterburner thrust, fuel flow), motion and signatures. The motion model uses a pseudo-5 DOF aerodynamic mathematical model and assumes no sideslip.

The aircraft is controlled either by a MIL player using a pilot vehicle interface (PVI) or by the PDL. The PDL collects current information states of the players and makes global tactical assignments in order to achieve mission objectives. The REALIST program uses a rule-based expert system to convert the PDL tactical assignments into low level maneuver commands. In short, tactics are developed through the PDL, while the manner in which a maneuver is flown is controlled through the REALIST system.

Each player's signature characteristics can be set for the following operating frequencies: (1) radio, (2) infrared, (3) visual, and (4) ultraviolet. The user has the capability to specify multiple wavebands within each operating frequency.

The avionics functions available onboard the weapon systems include architecture, antennas, sensors, fire control, communications and electronic warfare. Varying levels of functional detail are available, including simple ("cookie cutter") sensors and functional representations of sensor modes.

MIL II currently models integrated avionics suites to include a sensor manager that controls the emission state and operation of the individual sensors and a sensor data fusion capability. The data fusion function combines the outputs from each sensor to achieve the highest possible track quality.

The sensor models include active and passive sensor functions. Sensor types include radio frequency (radars and RWRs), electro-optical (IRSTs, staring and lasers), optical (eyes) as well as communication transmitters, receivers, and transponders. Sensors can perform search, acquisition, track, lock-on, illumination, identification, and kill assessment functions. Datalink communications are available, and the tracks can be passed from one player to another.

The ECM model, available for 1v1 engagements, possesses functional representations of standard ECM techniques (RGPO, VGPO, Cross Polarization, Terrain Bounce, Stand-off Noise Jamming, Self Protection Noise Jamming, Bin Masking and both Towed and Ejected RF Decoys).

Many of the air-to-air and surface-to-air missile functions are similar to aircraft functions. The aerodynamics functions are modified to account for differences in thrust-on and thrust-off drag. Propulsion modeling is currently limited to solid propellant rockets, with a time schedule for thrust and propellant weight replacing throttle inputs.

MIL II continued on page 12

'Many of the air-to-air and surface-to-air missile functions are similar to aircraft functions. '

MIL II continued from page 11

The missile seeker options include active, semi-active, or passive. Guidance options include semi-active, command-guided, passive (home-on-jam or infrared), active, inertial and multi-mode. The fuze function is based on miss distance from the target at the closest point of approach. Determination of target kill is based on an input probability of kill value, or table of values, and a random number selection.

MIL II DESIGN

One of the features of MIL II is its C++ object-oriented design. In this design, systems, such as aircraft, and subsystems such as sensors, are treated as separate objects. The resulting architecture incorporates object-oriented design and programming, dynamic data structures, flexible inputs, a standard user-object interface, embedded Expert System shells, multi-processing orientation, and standard programming techniques. This approach provides software that is (1) easy to modify and expand, (2) modular and reusable and (3) reliable and maintainable.

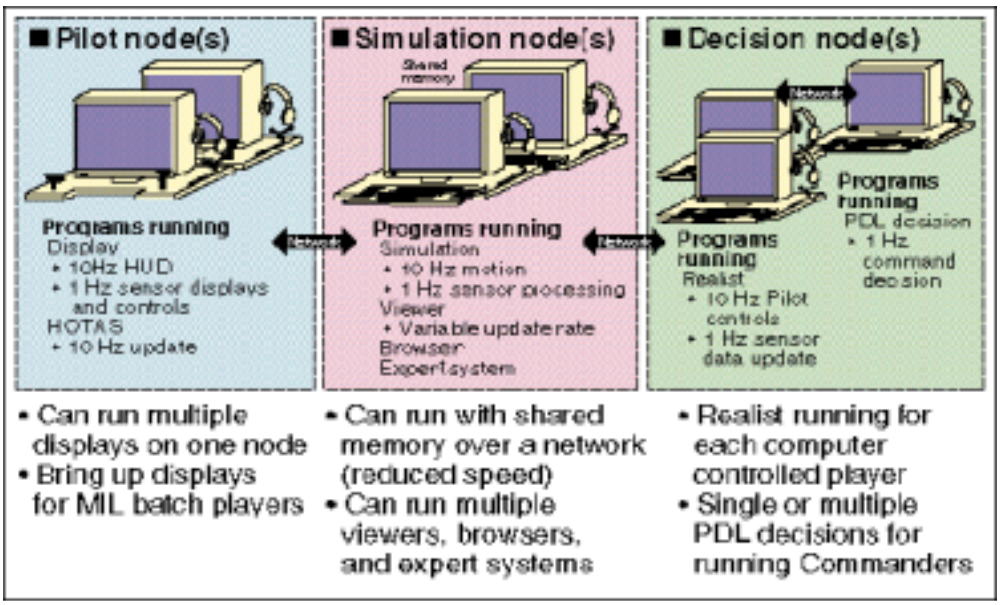
'...the design allows the model outputs to be customized by the user...'

MIL II inputs are closely tied to the structure of the objects using a tree hierarchy for data inputs consistent with the object hierarchy. Additionally, the design allows the model outputs to be customized by the user.

MIL II is comprised of five programs that are written in the C++ language. The PDL is a mixture of C++ and FORTRAN. MIL II program communications are handled through a mixture of shared memory interfaces that must execute on the same platform and network interfaces that may be distributed anywhere on the network.

It is desirable but not mandatory to distribute the MIL II processes among multiple computers. Using multiple computers allows the simulation to run more efficiently. Process distribution is used to maintain the near real time processing necessary for man-in-the-loop operations.

MIL II has a distributed interactive simulation (DIS) interface allowing connectivity with other DIS compliant simulations. In addition, MIL II has recently been confederated with



MIL II PROCESS DISTRIBUTION

the SWEG mission model providing higher fidelity and MIL air combat engagements.

MIL II DELIVERABLES

Each release of MIL II includes a standard set of generic input files. The generic input files serve to illustrate how to create the different kinds of systems and serve as templates for creating other similar systems. Likewise, the scenarios that use the supplied input files can be used as a starting point for developing new scenarios.

A MIL II Introductory Training Course is available at additional cost. A MIL II web page, containing the latest information concerning MIL II is available to all users. All available documentation is supplied with the software, digitally, in both Word and HTML formats, including all training material and a local copy of the web page. MIL II is a government owned model, managed by the National Air Intelligence Center, Engagement Analysis Branch, NAIC/TAAE, (937) 257-2404.

MIL II is available for distribution from SURVIAC by contacting Mrs. Geri Bowling at Com: (937) 255-4840, DSN: 785-4840, or by E-mail: gbowling@bah.com

TWE/BDAR continued from page 7

SUMMARY

The TWE/BDAR archival and retrieval system project is part of an on-going OSD Live Fire Test and Training Program. The project seeks to examine ways current and future threat effects and repair data collected from JLF, LFT&E and actual combat data can be exploited to support and enhance combat operations. Other critical BDAR and threat warheads effects data are also being included. Most of these data will be routinely sent to SURVIAC for preservation, storage and use for requirements such as this project envisions, as well as for others. Data currently at SURVIAC will easily support near-term demonstration and fielding of the system. Data flowing to or acquired by SURVIAC action will provide a continuous source of fresh data for the TWE/BDAR archival and retrieval system. The first phase of this three-phase effort formulated a concept for identifying and capturing combat and JLF/LFT threat effects, typical threat-induced damages, assessment processes, and repair information types and forms. The research also included: identification of data that are collected from JLF and LFT programs; the means of capturing available data; required data formats; capabilities for data input and retrieval to satisfy specific customers for the TWE/BDAR data; customer needs; and the output media that could best meet the customers' needs. The final result of the Phase 1 research was a feasibility demonstration of an archival and retrieval system for the information and products required as the final product of the first phase effort. The project is now moving on to the development of Phases 2 and 3 to finalize and implement the prototype TWE/BDAR archival and retrieval system.

For more information on the TWE/BDAR Training project please contact Mr. Alfred Yee at Com: 937-431-2716, E-mail: yee_alfred@bah.com

Ears to You!

The ESAMS portion of the D'DEAF_CRAB 1999 meeting commenced with the passing of the ESAMS ears to the current ESAMS model manager, Capt. Jonathan Fitton, Air Force Information Warfare Center, San Antonio, Texas. The official ears were first presented to Maj. Darren Durkee from Major Gregory (Gumby) Nowell both of Air Force Studies and Analyses Agency (AFSAA), in November 1997. During the D'DEAF_CRAB 1999, Linda Hamilton, BAH, at the request of Maj. Durkee, passed the ears to Capt. Lance Champagne, AFSAA, who in turn passed them to Capt. Fitton. The ESAMS group welcomed Capt. Fitton as thier new leader and have joined in the continued effort to promote ESAMS as a most valuable analysis tool.

E-MAIL US!

SURVIAC now has email accounts set up for your specific model and model meeting needs. If you have a question about your model or meeting, please e-mail us at one of the accounts below.

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RADGUNS: radguns@surviac.flight.wpafb.af.mil

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A Message from the New ESAMS Model Manager:

AFSAA has given up the position of model management and AFIWC has accepted the position. I have been working with ESAMS for about a year and a half in support of various operational customers. Some of our studies have stressed the software, revealing weaknesses which resulted in Model Deficiency Reports being submitted to SURVIAC. I plan to remain model manager until I PCS, sometime in early 2001, and someone else from my office will take over at that time. The future of ESAMS is somewhat cloudy due to JMASS. If JMASS lives up to its potential, it will eventually replace ESAMS. However, I expect ESAMS to be around for at least another 5 years, and probably longer. The transition plan from ESAMS to JMASS is still under development, but here is a brief summary of some of the things we are considering. Once a threat is released in JMASS, it will be marked for removal from ESAMS. The ESAMS model will be supported for a year or two to make sure the JMASS model is working properly. After this period, the ESAMS model will not be supported and it will be removed from the next major release. We may try to make the transition somewhat transparent to the user by using a DIME-type interface. This interface would call the JMASS model if it exists and the ESAMS model if no JMASS model exists. We are also considering distributing AFIWC's Threat Engagement Analysis Model (TEAM) to provide an analytic-level IR threat capability. We are already working on transitioning TEAM to the JMASS architecture.

The next major release of ESAMS will be version 3.0. We decided to refer to it as 3.0 instead of 2.9 because it represents a major change in the code, specifically: changing from FORTRAN 77 to FORTRAN 90. If you don't have a FORTRAN 90 compiler, you will need to get one. Release of version 3.0 is currently scheduled for the beginning of March, 2000.

Capt Jonathan Fitton
ESAMS Model Manager

OCTOBER

Air Targets Symposium & Exhibition

4-7 October 1999

Albuquerque, New Mexico

NDIA, Com: (703) 522-1820, E-mail: adekleine@ndia.org Web: http://www.ndia.org

TACOM APBI

25-27 October 1999

Dearborn, Michigan

NDIA, Com: (703) 522-1820, E-mail: mmccrory@ndia.org Web: http://www.ndia.org

DIME, ESAMS Users Group Meeting

26-28 October 1999

Ft. Worth, Texas

SURVIAC, Ms. Geri Bowling, Com: (937) 255-4840, DSN: 785-4840

E-mail: gbowling@bah.com, Web: http://iac.dtic.mil/surviac

NOVEMBER

Joint Interim Mission Model (JIMM) User and Configuration Review Board Meeting

2-4 November 1999

Kirtland AFB,New Mexico

SURVIAC, Ms. Geri Bowling, Com: (937) 255-4840, DSN: 785-4840

E-mail: gbowling@bah.com, Web: http://iac.dtic.mil/surviacl

DTIC Annual Users Meeting and Training Conference

7-10 November1999

Arlington, Virginia

DTIC, Julia Foscue, Com: (703) 767-8236

36th Annual AOC International Symposium and Convention

14-18 November 1999

Anaheim, California

AOC Conference Dept. (703) 549-1600 or (888) OLD-CROW

Fax-on-demand (800) 678-3324

Aircraft Survivability 1999 Symposium

15-19 November 1999

Naval Postgraduate School, Monterey, California

NDIA, Com: (703) 522-1820, E-mail: adekleine@ndia.org Web: http://www.ndia.org

Air-to-Air (BRAWLER) User Group Meeting

30 November - 2 December 1999

Nellis AFB, Nevada

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